Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

9
P69P

THE PLANT DISEASE REPORTER

Issued by

THE PLANT DISEASE SURVEY, DIVISION OF MYCOLOGY AND DISEASE SURVEY
BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING
AGRICULTURAL RESEARCH ADMINISTRATION
UNITED STATES DEPARTMENT OF AGRICULTURE

SUPPLEMENT 152

THE VALUE OF PLANT DISEASE SURVEYS IN EXTENSION, RESEARCH, AND QUARANTINE PROGRAMS

152-166
1945-1946

January 15, 1945

LIBRARY
RECEIVED
☆ MAR 2 1945 ☆
U. S. DEPARTMENT OF AGRICULTURE
BELTSVILLE BRANCH

LIBRARY
RECEIVED
☆ MAR
U. S. DEPAR
BELT

The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

U. S. DEPARTMENT OF AGRICULTURE
LIBRARY
BELTSVILLE BRANCH

THE VALUE OF PLANT DISEASE SURVEYS IN EXTENSION, RESEARCH, AND QUARANTINE PROGRAMS

Plant Disease Reporter
Supplement 152 January 15, 1945

The three papers that follow were presented at the Plant Disease Survey Conference, December 10, 1944, during the Cincinnati meeting of the American Phytopathological Society.

CONTENTS

	Page
Ways in Which the Emergency Plant Disease Prevention Program Aids Extension, by Charles Chupp	3
Research and Plant Disease Surveys, by Neil E. Stevens	6
Relations of Plant Disease Survey to Quarantine and Regulatory Activities, by W. A. McCubbin	13

WAYS IN WHICH THE EMERGENCY PLANT-DISEASE PREVENTION PROGRAM AIDS EXTENSION

By Charles Chupp[1]

During and after the first World War, when the Plant Disease Survey was started, prizes were given to individuals reporting the most diseases and in the most counties in New York State. Every disease on every host was reported in every county, so that we certainly knew what diseases were present.

During the first World War such a survey was acceptable and desirable, but since then, many changes have been made in our extension work that require different kinds of information. During the first World War, extension consisted mostly of propaganda: drives to do this, or campaigns to do that. We printed 100,000 leaflets on oat seed treatment alone, plastered the State with them, decorated drugstore windows, ran demonstration trains, and lived and ate "oat seed treatments."

But now a large percentage of our growers are college graduates who have taken courses in plant pathology or, if not graduates, have made a close study of disease control and are acquainted in detail with most of our common diseases and their control. They are almost literally sitting on our doorsteps waiting for the newest pronouncement of the research man. They would be disgusted with and insulted by our old type of campaigns or drives.

This change, or progress, in the methods of extension means that we need an entirely distinct type of plant disease survey. I can illustrate best what I mean by citing particular instances of the work Drs. Leon J. Tyler and John Niederhauser have been doing as representatives of the Emergency Plant Disease Prevention Program in New York and Pennsylvania.

For a long while we have been aware that one of the sources of food losses was in winter storage, but no one in our State had had recent opportunity of studying storage-house conditions. Dr. Tyler spent the greater part of last winter making such a survey, observing the manner in which the storage houses were run, the amount of loss, and possible means of reducing the rots that were taking such a big toll of carrots, celery, apples, and other stored products.

Probably the most important thing he observed was that few men who run storages were experts at the job. What they need above all else is a course in proper storage management. It is doubtful if our College can give this until additional contributions are made by the research men. Even so, merely a tour to the best-run houses should be of great benefit to the average plant manager.

Some storage houses are so poorly constructed or so illogically arranged that even a good manager could not hold vegetables at the proper temperature and humidity. The course, if given, would have to include construction and arrangement.

Also Dr. Tyler found new problems in diseases. He found a rot on onions, which probably is not new, but which accounted for the biggest percentage of loss of onions in storage. He found a spotting or specking of certain varieties of apples in the Hudson Valley, the cause of which must yet be determined.

---

[1]Extension Plant Pathologist, Cornell University, Ithaca, New York

I bring this matter of storage-house inspection to your attention, as a sample of a unified project in disease reporting, which has for its purpose the help it can give to the extension specialists, and the revealing of possible problems for the research man.

There are still projects that require the old-fashioned method of procuring information on the extent and the amount of any given disease. In New York over one million bushels of seed grain are treated at elevators or seed houses. The annual question that arises is whether oat smut or stinking smut of wheat still occur in great enough severity for seedsmen to be justified in treating the seed. A fairly accurate answer must be given them in order to keep them interested in the program.

Then we have still another reason for surveys. The extension specialist finds that he can generate much enthusiasm for spraying potatoes and tomatoes after potato late blight once appears in the State. In every State there are certain localities where the blight nearly always occurs first. A close watch of these areas is a worthwhile project.

One of the most helpful things the disease reporter can do is checking up on disease control practices and recommendations. In so many cases the extension specialist must try things not fully proved by the investigator. For instance, I have had for several years some indication that Septoria blight of tomatoes could be controlled under New York State conditions without field spraying. I wanted more data. Dr. Niederhauser made a detailed survey of tomato fields. In addition to those I visited, almost 200 fields were observed. Although a few fields, especially in the market garden sections, had infection, the inoculum of which could not be traced, it seems fairly safe to assume that the following of these 3 recommendations eliminates Septoria in New York:

1. Use of home-grown seedlings, the seeds for which have been hot-water-treated and the plants sprayed at 7-day intervals in the seedbed.
2. Three-year rotations, being careful not to plant immediately adjoining a field of the previous year. Two-year rotations have been proved to be ineffective.
3. Eradication in the preceding fall of all horse-nettle, the only other known host of this Septoria in the State.

Incidentally, additional information on this same subject was obtained by a seed company that for years had planted 8 varieties for inspection and certification. In 1944 this company for the first time carried out in detail these 3 recommendations. Not an infected leaf could be found even on such a previously susceptible variety as Scarlet Dawn. All of the stock the previous season was infected.

In a similar manner a survey was made of a district where we attempted to control Cladosporium pox of cucumbers. For a long time the usual spraying program had been recommended, and the farmers had followed it with indifferent success. I had some observational data that seed treatments accompanied by rotation controlled scab, but there was no investigational evidence. In a seed treatment clinic we treated all or part of the seed for 35 farms. When the survey was made the first of October, the county agricultural agent wrote that the results were like those one dreams about but rarely achieves. On farms where there were 2 fields, one from treated seed and the other from untreated, or where there were 2 adjoining farms, one with treated seed and rotation, and the other

lacking one or both, there was the difference between a perfectly healthy crop and a badly diseased one.

I mention all these projects to show that the plant disease survey man should be there to supplement the work that has been undertaken, and by his survey, bring data that either the extension specialist or the investigator may use to further the plant disease work in the State.

In other words, he should put his efforts into distinct projects, and not merely cover the State and report diseases indiscriminately. The latter information in many cases merely duplicates what the State men already know, or what they learn in their daily travels about the State.

In order to be of most value, it would be well if every important State could have a survey man for that State alone. In New York and Pennsylvania, where nearly every crop known in the temperate zone is grown, the problems are too numerous for one survey man todo justice to both States. Either State could keep a man busy all year with a great increase in the effectiveness of the entire phytopathological work if the surveying were done by the project method, and continued without interruption for the entire year.

CORNELL UNIVERSITY

RESEARCH AND PLANT DISEASE SURVEYS

By Neil E. Stevens[2]

Research on Means of Improving Crop Loss Estimates: Like each of the other topics assigned the question of research on means of improving crop loss estimates is a very large subject. Everyone interested should reread two papers published this year in the Plant Disease Reporter, C. M. Haenseler's paper beginning on page 38 of the January 15, 1944 number and K. Starr Chester's which makes up Supplement 146. From each of these papers one sentence will be quoted.

> "Certainly there can be no single standardized system of collecting plant disease data which will meet all needs". (Haenseler, page 38)

> "Again it may be emphasized that no method gives completely unchallenged results in determining rust losses, but the resultant conclusion from several methods is highly significant" (Chester, page 108-109)

It is extremely unlikely that all the possible methods have been used or for that matter generally discussed. In the course of the conference on this subject held last August by the Plant Pathologists of the Upper Mississippi Valley, R. A. St. John remarked (unfortunately in an aside) "You people are wasting too much time and gasoline. The kind of information you want could be gotten much more quickly by twenty well placed long-distance telephone calls each week." Before you decide that he is wrong, better think it over a bit.

Recently in reading the introduction of Dampier's "History of Science" I came across this remark "The whole of existence is too great a thing to yield its secrets when studied in one aspect only." Most of what I have to say may be summed up in the paraphrase "Plant Disease problems are too great to yield their secrets when studied by one method only." If I speak with enthusiasm of field study, it certainly does not mean that I am unaware of the importance of experiments.

The Importance of Survey Data to Research Programs. The second topic assigned was the "Importance of Survey Data to Research Programs." First, what is meant by survey data? According to the Century Dictionary, "to survey" means: "to take a comprehensive view of, to scrutinize, to inspect carefully." The importance to any real research of data secured by these methods is obvious, so obvious, indeed, that the committee can hardly have felt that it needed emphasis. What I think was intended was a discussion of the importance of data secured by field observation on plant diseases in connection with research programs which are primarily experimental. This is a point that may well be worth a bit of emphasis because it is too often overlooked.

So much more of our time, money, and available publication space is given over to experimental work that we are in danger of regarding the experiment as both the beginning and the end. Actually it is neither.

---

[2]Professor of Botany, University of Illinois, Urbana, Illinois

In applied plant pathology, at least, field observations, that is, plant disease surveys (whether so-called or not is immaterial) are of critical importance at both those stages in the research program. Shall we undertake just any problem, or one that appears important? Obviously the latter. How shall a worthwhile program be chosen? By observation, of course, by a survey made by ourselves or someone else. Life is far too short to carry out experiments to decide whether a given disease is, or is not, worth studying.

Again, at the conclusion of our experiments, how do we determine whether they have permanent value? Again by observation, that is, by a survey. There is no other way. This is conspicuously the case in breeding programs. In spite of all our attempts at testing by means of plots, uniform or otherwise, the real test of a new variety is its culture in the hands of 10 to 20 thousand farmers and the results of this test can be taken only by the survey method.

It is certainly not necessary to remind you of the close coordination of these two methods of attack maintained in the wheat breeding program so long centered at Minnesota. You all know how much information has been added by careful observation of the new varieties after they were released for commercial cultivation. You know also how often field observations have modified the experimental program.

I believe it will prove a serious loss to both genetics and plant pathology that no comparable body of information is being accumulated in connection with the breeding of hybrid corn. The difficulties would be great. The extent of the program, the number of organizations involved, and the fact that so many popular hybrids have "closed" pedigrees, all tend to make such surveys more difficult than in the case of wheat. On the other hand the very size and uniqueness of the corn breeding program make such surveys unusually desirable. Under our very eyes -- even if those eyes are half-closed -- we are transforming this major crop from a freely cross pollinating and varying plant into a synthetic product. It is known in the trade that there have been serious outbreaks of disease in hybrid corn in various localities, but only in the case of Helminthosporium leaf spot are there in existence anything approaching adequate records.

What I have been trying to say was much better said by Lord Moynihan, then president of the Royal College of Surgeons of England, in an address delivered at the Opening of the Banting Research Institute of the University of Toronto. In this address, which bears the title "The Science of Medicine" (printed in the Lancet, Vol. 219, pt. 2, Oct. 11, 1930, pp. 778-785) and speaking, of course, with special reference to the field of medicine, he discusses both the difficulties and the importance of acquiring information by observation. Among other things he says:

> "It would accordingly seem to be the clear, indeed the paramount, duty of the teachers of Medicine to inculcate the virtues and to instruct in the methods of observation as the primary faculty required in students." (p.779)

He frankly admits that:

> "The method of observation is at the moment out of fashion; the vast treasures of knowledge it has

> created for us, all the advances in medicine resulting from it, are disparaged and in danger of being forgotten." (p. 781 b)

A few lines later he adds:

> "Observation is, indeed, the first act in scientific procedure, and it is the last act also. Experiment plays its most necessary part in intermediate stages, but is throughout subject both to initial direction and to final control, either to renunciation or to acceptance." (p. 781 b)

He repeatedly lays emphasis on a fact we too often forget, that in everything relating to experiments:

> "The isolation of one incident for purposeful investigation, the planning of the collateral experiment, the nature of the question asked, and so forth, are all matters which, by comparison with clinical inquiry, are extremely simple." (p. 782 b)

For the words "clinical inquiry" substitute "field observation", and the statement applies equally well to plant pathology. It appears to be his belief, as it is mine, that one of the reasons field observation is at present so little in vogue is that it is inherently more difficult, more mentally arduous, more risky than experimentation.

Elsewhere in the paper he says:

> "Events in Medicine, as elsewhere, are rarely dependent upon a solitary cause, and Medicine is perhaps distinguished from all other sciences, not only by the number and interaction of possible causes, but by the remoteness, apparent irrelevancy, and obscurity of causes, whether immediate or proximate." (p. 780 b)

Fortunately Lord Moynihan included the work "perhaps." For Plant Pathology is little, if any, simpler than Human Medicine in this respect.

Research by Means of Survey Methods. Finally, are there worthwhile problems in our field that can be attacked only by survey methods? I more than half suspect that it was my well-known conviction that there are such problems and that they are very much worthwhile that led the committee to allot me this time.

In general, any attempt at studies on the ecology of plant disease must rest, for the present, almost solely on estimates of disease losses obtained by survey methods.

Adequate evaluation of the efficiency and economic soundess of some extensive disease-control programs can be made only by more adequate plant disease surveys. To cite a conspicuous example, there is no way to check the value of eradication as a means of controlling Fireblight until we have real information regarding the extent to which this disease fluctuates in the absence of any attempt at control.

Recently, J. R. Kienholz (Weather Cycles and Fruit Diseases at Hood River, Oregon, PDR 21 (2): 77-81, 1943) has called attention to the fact that the marked decrease in Apple Scab in the Hood River Valley which

began in 1917 coincides with two quite different types of influences: first, the introduction of lime sulfur and more effective spray schedules, and second, an eleven-year period of below-average rainfall. During the years 1917-1932 May and June rainfall, in particular decreased sharply. You can all recall instances in which the decline in the severity of a disease was credited, not always by the investigator, to some control measure, only to have the disease later increase in the face of the same control measure but under different environmental conditions.

The other side of the picture is, of course, determining whether any control is worth what it costs. I believe most of you will agree that outside the field of ornamentals, control should cost demonstrably less than the probable losses from the disease and that we owe it to our profession not to urge the use of any control method unless it meets this economic test. In this area we are helpless without estimates of disease losses, procurable so far as I can see only by survey methods.

There is also the field of disease forecasting, fascinating as a problem in itself and, I believe, of great potential practical importance. On what else can we base forecasts other than disease loss estimates obtained by survey methods? At the risk of starting a discussion more heated than enlightening, I wish to reemphasize my conviction that for these purposes poor records are better than none. Naturally such data must be handled with caution. But any data worth studying must be used with caution. (I should like to devote twenty minutes to discussing the dangers involved in the rash use of the concept of probable error.) During the last few years, I have had frequent recourse to the reports of crop conditions and crop losses contained in the columns of old country newspapers. My friend Dr. H. J. Franklin has made more extensive and more important use of the same source of information in his monumental studies of frost forecasting. (Weather in Cranberry Culture. Massachusetts Agricultural Experiment Station Bulletin 402.1943)

As an illustration, take the records of Bacterial Wilt on sweet corn for the last few years, merely the scattered reports that came in to the Plant Disease Survey and were published in the Plant Disease Reporter. For 1942 these boil down to four. In June the disease was observed on sweet corn in Rockland County, New York and Bedford County, Pennsylvania. For Massachusetts, Boyd said flatly in September, "Not a single stalk, even in Bristol County where there is ordinarily a small amount each year." From Nassau, Long Island the September 1 report is, "Bacterial Wilt scarce."

Admittedly these are just a few scattered reports, yet taken in connection with earlier observations they may well have real significance. The experiment in forecasting the incidence of Bacterial Wilt of sweet corn in the eastern United States was concluded in 1940 (PDR 25: 152-157. 1941). These forecasts were made to test the validity of an hypothesis advanced in October 1934 (PDR 18: 141-149) that there was a correlation between winter temperatures and the incidence of Bacterial Wilt on sweet corn during the following summer. The hypothesis was that this disease would be of little or no importance in the northeastern United States following a winter with an index, -- that is, the sum of the mean temperatures for December, January, and February -- below 90, and present in destructive amounts following a winter with an index above 100, with intermediate conditions following winters between 90 and 100.

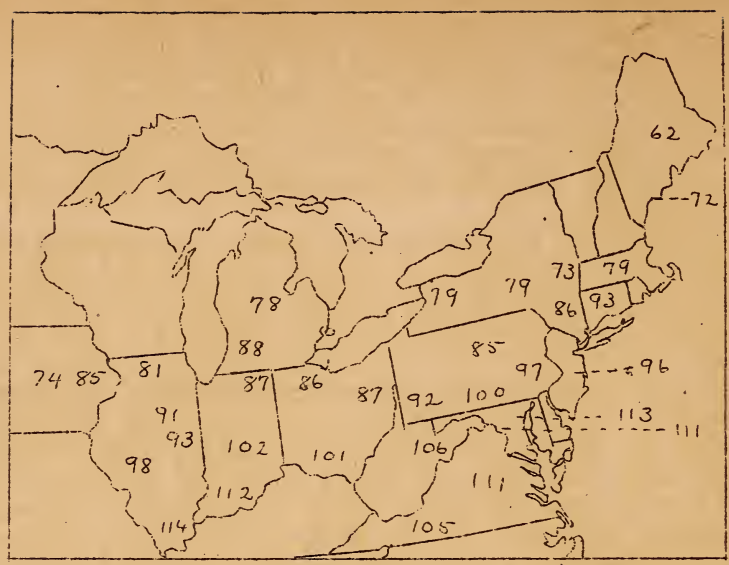


Figure 1. Winter temperature indices (sum of monthly means for December, January, and February) for 1941-1942

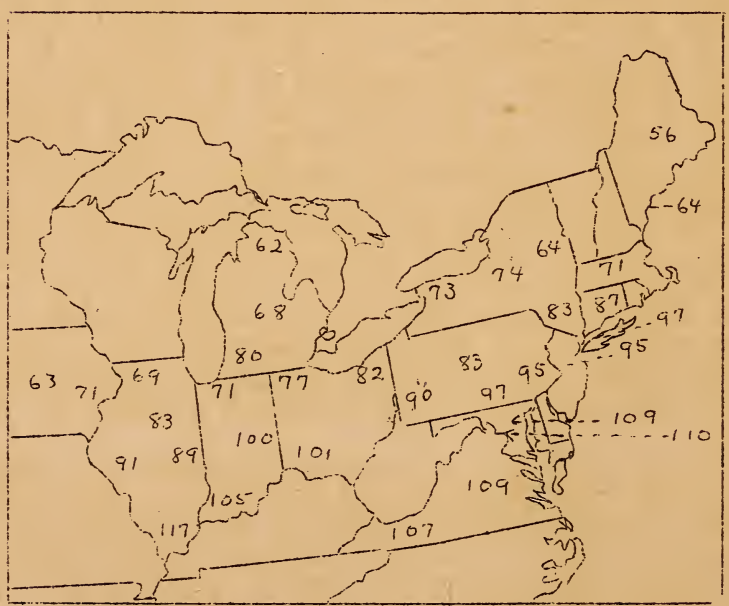
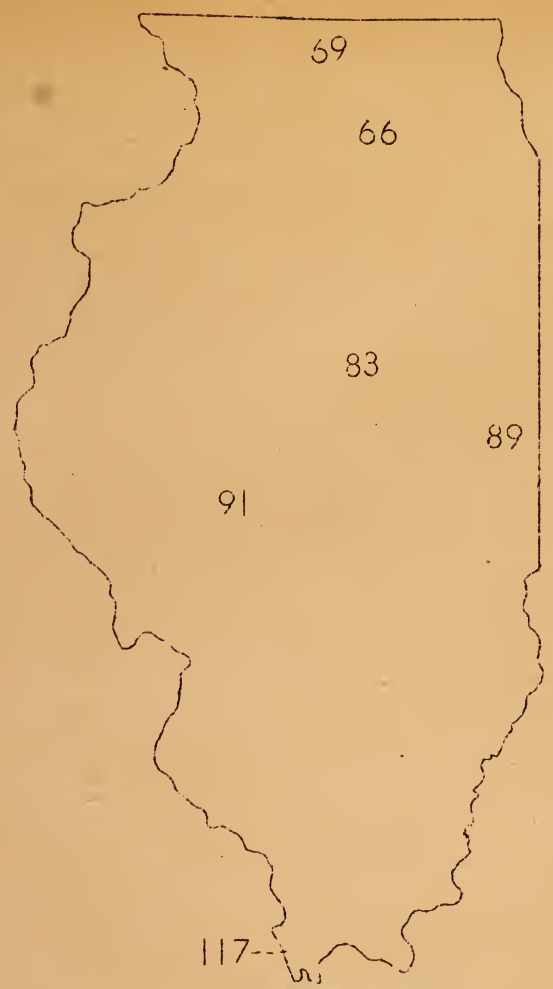


Figure 2. Winter temperature indices for 1942-43.



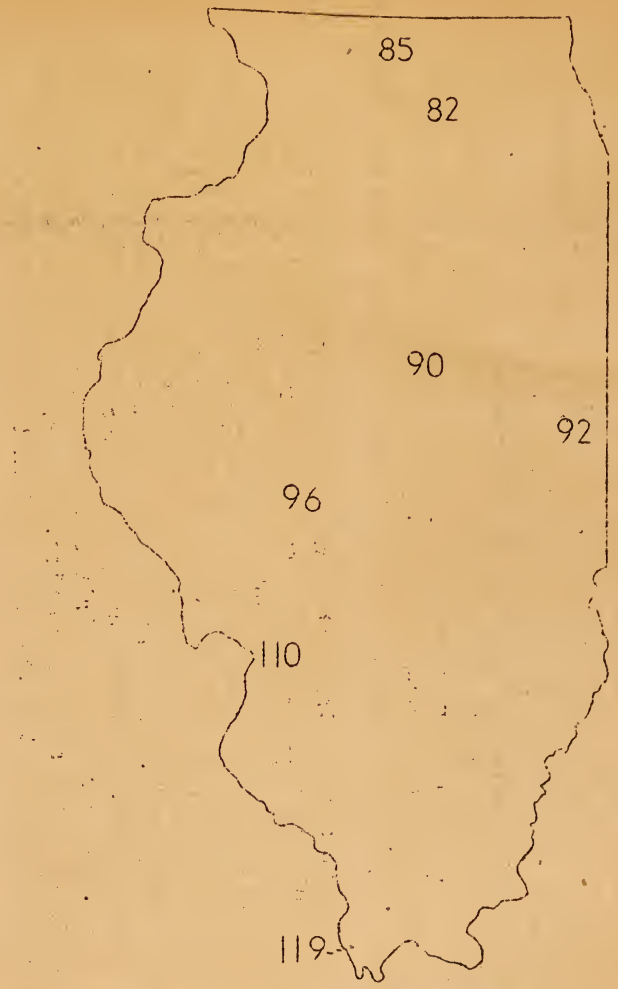


Figure 3. Temperatures indices at various Illinois stations for the winters indicated.

The 1942 reports from New York and Massachusetts give one more opportunity to check this theory and to note that the relation continues to exist in this area (see Figure 1.)

In 1943 there is no record whatever from Massachusetts although surveys were being made as is evidenced by the report that Smut was very bad in sweet corn. The disease was reported from one planting in Connecticut. This isolated record again permits a check of the theory (see Figure 2). The Ohio estimate is a 3% loss on sweet corn. Wisconsin notes that Bacterial Wilt is of slight importance as usual, and Illinois, "Generally the early planted sweet corn was affected slightly by Wilt".

These again are the merest fragments of information, but taken in conjunction with the 1944 reports from Missouri and Illinois of severe losses to sweet corn in the region around St. Louis and East St. Louis, they do add one more case in which a rise in winter temperature was followed by an increase in the incidences of Bacterial Wilt in sweet corn (see Figure 3).

Finally it is my considered opinion that we are purposefully and unnecessarily increasing the difficulty of handling our reports by our growing timidity in the use of figures for crop loss estimates. The arguments against the use of percentage or other figures in the crop loss estimates are well known to you and will, no doubt, be repeated this morning. None of them appear particularly valid because as yet no adequate substitute has been suggested. We find ourselves in the position of the man in the parable (Luke 11:24-26) who cast out an unclean spirit but put nothing in its place. Whereupon the spirit returned and finding the place swept and garnished, took seven other spirits, more wicked than himself, entered in and dwelt there and the last state of that man became worse than the first.

UNIVERSITY OF ILLINOIS

RELATIONS OF PLANT DISEASE SURVEY TO QUARANTINE AND REGULATORY ACTIVITIES

By W. A. McCubbin[3]

It is well understood that the Plant Disease Survey function constitutes an intermediate and not a final activity. Such an organization breeds no resistant varieties, sprays no potatoes, treats no seeds, issues no quarantine, trains no student body. Yet in the national scheme of things it may make valuable and even indispensable contributions to each of these useful accomplishments. In short, a Plant Disease Survey agency is to be regarded preeminently as a fact-finding institution, organized and equipped to assemble and maintain a storehouse of certain basic factual information on pathogens, and ready like a conscientious middleman to dispense its stock in neatly packaged lots to a host of other workers, as raw material which can be elaborated into products of ultimate national value.

In estimating the role of such an agency, therefore, our thought should rise beyond any one phase or aspect of its activity, and should try to envision the broad and useful place it does and should occupy in that national scheme of organization towards which we pathologists are gradually struggling, in the hope of dealing more effectively with our country's perplexing disease problems. On this level of national need we see a Plant Disease Survey service as a specially constituted agency exercising a variety of functions, having numerous and widespread relations, and by common consent charged with certain unique responsibilities.

Let us review in outline the varied character of the functions we associate with this organization:

1. It is expected, of course, to collect current and timely information on diseases of crops, promptly making public new items, digests, lists, summaries, and analyses for immediate use in various ways.
2. It is regarded as an active sponsor not only for routine survey effort but for special features or those of emergency nature, bringing to bear on all of them its special experience and its knowledge of the most effective methods, and aiming to provide trained personnel, either drawn from its own staff or secured through collaborator or cooperative arrangements.
3. It aims to build up a mass of useful factual information on the world's pathogens, domestic and foreign, assembled from a variety of sources, accessible for use on call, and providing all available data on such things as classification and synonomy, characters, life habits, host range, distribution, and economic significance.
4. We rely upon it heavily to undertake or sponsor the difficult task of identifying actual disease specimens, including not only those from domestic sources, but those from all corners of the world as well.
5. We think it should have a well developed historical viewpoint, maintaining its records and files with an eye to the needs of future generations.
6. It seeks to render full service by making its accumulated stock of information available in a form most acceptable to each of its varied clientele, whether it be teacher, research worker, student,

[3]Senior Pathologist, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, U.S. Department of Agriculture

commercial firm, extension specialist, economist, quarantine official, pest control worker, or the ordinary citizen.

7. In nature and range these various functions display a wide diversity. Yet it is clear that they are all so intimately related, so mutually interdependent, that they constitute a natural unity of function. In the national sense, therefore, they belong together, and it would seem to be in the interest of national economy as well as efficiency to center the whole under one leadership as far as practicable.

These several activities of a Plant Disease Survey are summarized here merely in order to bring out more clearly the close relations which naturally exist between such a general center of disease information and the various quarantine and regulatory agencies -- that is, those having to do with foreign quarantines, domestic quarantines, or state quarantine and regulatory measures.

In summarizing for discussion the various relations between the Plant Disease Survey function and these agencies, it is useful to distinguish between two fields of quarantine and regulatory interest, -- one, the foreign plant quarantine field proper, where effort is directed to excluding foreign pests or in coping as best we may with unfortunate introduction of these; and two, the purely domestic field where official action is taken in the public interest to suppress, mitigate severity, prevent or delay spread, or assist in the control of indigenous pests or those long established within our own borders.

In the first mentioned group of activities -- the foreign disease field -- the defensive barriers which our national plant quarantine system aims to set up for preventing the further introduction or domestic dissemination of injurious foreign diseases, should logically comprise four basic elements: 1. An organized effort to learn everything possible about the numerous foreign diseases still awaiting an opportunity to enter our country, so that timely and intelligent measures may be taken to prevent their introduction; 2. A careful supervision over imports which might carry these intruding pathogens, involving certain prohibition and the various restrictions on entry applicable to foreign cargo, express, mail, and baggage importations, with due emphasis on inspection and treatments; 3. A watchful survey organization, designed to detect foreign diseases which may have eluded the port defense barrier, a detection system effective enough to discover unfortunate new disease introductions while they are in an incipient stage or still isolated in restricted areas and thus possibly amenable to restriction or eradication; and 4. Existing state or federal quarantine organizations having power to undertake eradication or to plan measures which may prevent or delay spread pending the development of control methods.

In its every phase this quadruple system of defense integrates very closely with one or another aspect of the Plamt Disease Survey service as above outlined. How can we as a nation plan intelligent and effective foreign plant quarantine measures without adequate knowledge of the alien pathogens we wish to keep out? Again, unless that knowledge is carefully assembled and brought convincingly before the American public, how can we expect to obtain understanding of and support for the needed protective quarantine action? And in either case to what competent source of essential information can we turn, if not to a special agency created and equipped to compile and disseminate and make available just

such information? A plant disease survey structure designed to function on the national scale just outlined would thus bear a fundamental and indeed indispensable relation to all foreign plant quarantine effort.

The central disease information agency we have pictured can serve the plant quarantine effort in still another outstanding way. In the course of port inspection pathogens are constantly encountered on imports from all over the world. The identification of these is an enormous and difficult task and one far beyond the time or the capacity of the busy inspector himself. Granted that in time he learns to recognize a quarter or a half of those he finds, what will be done with the remaining multitude of unknowns? If our quarantine system ignores or neglects these it is not fully discharging its national responsibility. The obvious answer is to route these unknowns to a central agency manned and equipped to determine their identity and nature with certainty. Such a service clearly falls within the province of Plant Disease Survey functions already mentioned. In passing it may be noted that while there is a direct benefit to the quarantine agency from this service, at the same time the national stockpile of disease information is effectively increased by this varied and constant stream of new contributions.

The third line of quarantine defense mentioned postulates some sort of specific survey arrangements in this country for the prompt detection of foreign diseases which may have eluded our admittedly imperfect protection barriers. The enormous advantage to the nation of locating such intruders immediately is so obvious that the usefulness of such a survey feature will scarcely be questioned. And it is clear that whatever procedure is adopted to serve this special need, this type of problem falls definitely into the field of plant disease survey functions. For example, the special pest survey activities conducted around ports of entry during the last two seasons by the Bureau of Entomology and Plant Quarantine disclosed, among other findings, spot occurrences of a new potato rot, Phomopsis tuberivora, and a new pear scab, Elsinoë piri. A good deal of additional survey work will still be needed to determine the areas in which these newcomers are distributed.

In that phase of the domestic quarantine field where recently introduced foreign diseases come into consideration, accurate and thorough disease surveys are likewise recognized as a necessary preliminary to effective control and regulatory measures. Here, however, conditions are somewhat different. Whereas the truly foreign field envisages a multitude of miscellaneous pests, in great part unknown, this domestic phase usually involves single pathogenic species about which enough is usually known for survey purposes; and while in these domestic surveys both program and method can profitably be integrated in many ways with the Plant Disease Survey field of interest, they need not rely so heavily on that agency for basic information and for pathogen identification as must be the case in the purely foreign quarantine field.

There remain for comment the relations of a Plant Disease Survey to situations in the second field of quarantine and regulatory interest mentioned earlier, where indigenous or long established diseases are subjected to control or regulatory measures, under either federal or state authority. Here again the survey function usually plays a prominent role both in initiating and guiding the course of such activities. And here again are opportunities for national service by a Plant Disease Survey, whether in the way of actual survey leadership, or through special

survey projects, or by extending cooperative aid, or in an advisory capacity, or by information supplied.

From this brief summary it will be seen that throughout the quite extensive range of regulatory activities the Plant Disease Survey function appears prominently everywhere. The relationships of a central national Plant Disease Survey organization to these activities vary according to circumstances; in some cases it is found performing a vital and an indispensable service; in others putting forth special or emergency efforts, carrying on routine aid, or making cooperative contributions; and in still others filling a lesser but still helpful role in perfecting methods, supplying information, and preserving faithful records, -- in short, rendering distinct and invaluable services all through the quarantine and regulatory field.

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE